

## Claims

Claims 1-16  
29/840 9/28/01 CJA  
1 A method for constructing a printed circuit board assembly, comprising the steps of:

- 2 (a) providing a printed circuit board comprising:  
3 a top surface comprising a top pad, wherein the top pad is electrically  
4 connectable to a top component;  
5 a bottom surface; and  
6 a via extending through the circuit board from the top surface to the  
7 bottom surface, wherein the via is electrically connected to the top pad, and  
8 wherein the via includes an opening at the bottom surface; and  
9 (b) forming a plug in the via by inserting a volume of material into the via through  
10 the opening in the via.

1 2. The method of claim 1, wherein the printed circuit board comprises a middle layer between the  
2 top surface and the bottom surface, wherein the middle layer comprises an electrical circuit  
3 pattern, and wherein the via is electrically connected to the electrical circuit pattern.

1 3. The method of claim 1, wherein the via is plugged by a process comprising the steps of:

- 2 screening solder paste into the opening in the via to form a solder mass within the via;  
3 and  
4 reflowing the solder mass, wherein the solder mass is redistributed within the via so as to  
5 form the plug.

1 4. The method of claim 1, wherein the via is plugged by a process during which a bottom  
2 component is installed onto the bottom surface, comprising the steps of:  
3 screening solder paste, wherein the screening inserts solder paste into the opening in the  
4 via to form a solder mass within the via and onto a bottom pad located on the bottom surface to  
5 form a solder layer;  
6 placing the bottom component on the bottom surface, wherein the bottom component is  
7 in mechanical and electrical contact with the solder layer; and  
8 reflowing the solder mass and the solder layer, wherein the solder mass is redistributed  
9 within the via so as to form the plug, and wherein the bottom component is mechanically and  
10 electrically affixed to the bottom surface.

11 5. The method of claim 1, further comprising the steps of:

12 installing the top component on the top surface, wherein a contact element of the top  
13 component is mechanically and electrically affixed to the top pad;  
14 placing a second component on the printed circuit board; and  
15 wave soldering the bottom surface, wherein the second component is mechanically and  
16 electrically affixed to the printed circuit board.

1 6. The method of claim 1, wherein step (b) is preceded by the step of:

2 installing the top component on the top surface, wherein a contact element of the top  
3 component is mechanically and electrically affixed to the top pad;

4 and wherein step (b) is followed by the steps of:

5 placing a second component on the printed circuit board, and

6 wave soldering the bottom surface, wherein the second component is mechanically and  
7 electrically affixed to the printed circuit board.

1 7. The method of claim 5, wherein the top component is a ball grid array module, and wherein the  
2 contact element is a solder ball.

3 8. The method of claim 5, wherein the top component is a surface mount device with a lead,  
4 wherein the contact element is the lead.

5 9. The method of claim 5, wherein the installation of the top component is accomplished by a  
6 process comprising the steps of:

7 screening solder paste onto the top pad to form a layer of solder;

8 placing the top component on the top surface, wherein the contact element is in  
9 mechanical and electrical contact with the top pad; and

10 reflowing the layer of solder, wherein the contact element is mechanically and electrically  
11 affixed to the top pad.

1 10. The method of claim 5, wherein the second component is a pin-in-hole component  
2 comprising a pin-component lead, wherein the pin-in-hole component is placed on the top  
3 surface, wherein the pin-component lead is directed from the top surface into a pin hole, and  
4 wherein the pin hole extends from the top surface to the bottom surface.

1 11. The method of claim 5, wherein the second component is a bottomside component, wherein  
2 the bottomside component is mounted on the bottom surface, and wherein the bottomside  
3 component is in mechanical and electrical contact with the bottom surface.

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1 12. A method for constructing a printed circuit board assembly, comprising the steps of:

2 (a) providing a printed circuit board comprising:

3 a top surface comprising a top pad, wherein the top pad is electrically  
4 connectable to a top component;

5 a bottom surface;

6 a middle layer between the top surface and the bottom surface comprising  
7 an electrical circuit pattern; and

8 a via extending through the circuit board from the top surface to the  
9 bottom surface, wherein the via is electrically connected to the top pad, wherein  
10 the via is electrically connected to the electrical circuit pattern, and wherein the  
11 via includes an opening at the bottom surface; and

12 (b) plugging the via while installing a bottom component onto the bottom surface, by  
13 a process comprising the steps of:

14 screening solder paste, wherein the screening inserts solder paste into the  
15 opening in the via to form a solder mass within the via and onto a bottom pad  
16 located on the bottom surface to form a solder layer;

17 placing the bottom component on the bottom surface, wherein the bottom  
18 component is in mechanical and electrical contact with the solder layer; and

19 reflowing the solder mass and the solder layer, wherein the solder mass is  
20 redistributed within the via so as to form the plug, and wherein the bottom  
21 component is mechanically and electrically affixed to the bottom surface; and

22 (c) installing the top component on the top surface, wherein a contact element of the

top component is mechanically and electrically affixed to the top pad.

- 1 13. The method of claim 12, wherein the installation of the top component in step (c) is  
2 accomplished by a process comprising the steps of:  
3 screening solder paste onto the top pad to form a layer of solder;  
4 placing the top component on the top surface, wherein the contact element is in  
5 mechanical and electrical contact with the top pad; and  
6 reflowing the layer of solder, wherein the contact element is mechanically and  
7 electrically affixed to the top pad.

14. The method of claim 13, wherein the top component is a ball grid array module, and wherein  
the contact element is a solder ball.

15. The method of claim 13, further comprising the steps of:

- (d) placing a pin-in-hole component on the top surface, wherein the pin-in-hole  
component comprises a pin-component lead, wherein the pin-component lead is  
directed from the top surface into a pin hole, and wherein the pin hole extends  
from the top surface to the bottom surface; and  
(e) wave soldering the bottom surface, wherein the pin-in-hole component is  
mechanically and electrically affixed to the printed circuit board, and wherein a  
mask is used to shield the bottom component from the effect of wave soldering.

1 16. The method of claim 13, further comprising the steps of:

- 2 (d) placing a pin-in-hole component on the top surface, wherein the pin-in-hole  
3 component comprises a pin-component lead, wherein the pin-component lead is  
4 directed from the top surface into a pin hole, and wherein the pin hole extends  
5 from the top surface to the bottom surface; and  
6 (e) wave soldering the bottom surface, wherein the pin-in-hole component is  
7 mechanically and electrically affixed to the printed circuit board, and wherein the  
8 bottom component is further affixed to the printed circuit board by the wave  
9 soldering.

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1 17. A printed circuit board assembly, comprising:

- 2 (a) a top surface comprising a top pad, wherein the top pad is electrically connectable  
3 to a top component;  
4 (b) a bottom surface;  
5 (c) a middle layer between the top surface and the bottom surface;  
6 (d) a via extending through the circuit board from the top surface to the bottom  
7 surface, wherein the via is electrically connected to the top pad, and wherein an  
8 opening in the via exists at the bottom surface; and  
9 (e) means for plugging the via.

10 18. The printed circuit board assembly of claim 17, wherein the means for plugging the via  
11 comprises a plug of material within the via.

12 19. The printed circuit board assembly of claim 17, wherein the means for plugging the via  
13 comprises:

14 a mass of solder paste within the via in the proximity of the opening that has been  
15 reflowed to form a plug.



1 20. The printed circuit board assembly of claim 17, further comprising:

2 (f) a bottom component installed on the bottom surface;

3 (g) the top component on the top surface;

4 (h) a plurality of pin-in-hole components placed on the top surface; and

5 (i) means for soldering the pin-in-hole components to the printed circuit board

6 without movement of solder into the via.

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